Interview Summary	Application No.	Applicant(s)	
	09/889,745	PEACH ET AL.	
	Examiner	Art Unit	
	Sunil Singh	3673	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Sunil Singh*. (3)_____.

(2) *Paul T. Bowen*. (4)_____.

Date of Interview: *1/26/05*.

Type: a)☐ Telephonic b)☐ Video Conference
c)☒ Personal [copy given to: 1)☐ applicant 2)☒ applicant's representative]

Exhibit shown or demonstration conducted: d)☒ Yes e)☐ No.
If Yes, brief description: oscillating & nutating cutter positioned on ~~the~~ a boom

Claim(s) discussed: 16, 50, 56, 64, 68

Identification of prior art discussed: Bennett (US 3429390), Stoebe (US. 6357831) & Dubois (US 3663054)

Agreement with respect to the claims f)☒ was reached in part. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: See .

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

applicant to amend ~~Claim 16~~ proposed claim 16 to include the boom having two pivot axis; the disc cutter ~~having~~ having a continuous circumferential cutting edge or ring. Other independent claims to basically have "boom" structure & continuous cutting edge & nutating and oscillating feature. It was agreed claim 16 as discussed above would be allowable of cited prior art.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Sunil Singh
Examiner's signature, if required

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FACSIMILE COVER SHEET
PLEASE DELIVER IMMEDIATELY!!!!

Our Ref.: 4412-10
Your Ref.: USSN 09/889,745 Date: January 26, 2005

To: Examiner Sunil Singh
Firm: USPTO – GAU 3673
Facsimile No.: 703-746-3785
From: Paul T. Bowen

Number of Pages (including cover sheet): 14
(IF YOU DO NOT RECEIVE ALL OF THE PAGES OR ENCOUNTER DIFFICULTIES IN TRANSMISSION, PLEASE CONTACT US IMMEDIATELY AT (703-816-4000).

Julie Krumpelman
FACSIMILE OPERATOR

ATTACHMENT/S: Draft Claims

MESSAGE: RE: USSN 09/889,745 – PEACH et al.
Our Docket: 4412-10

Dear Examiner Singh:

Attached are draft claims for your review prior to our 1:00 pm interview on Wednesday, January 26, in your office.

Best regards,

Paul T. Bowen
Reg. No. 38,009

PTB/jck

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-15. Canceled.

16. (Currently Amended) A rock boring device ~~of the type~~ comprising:

a boom having a first end and a second end, the first end being pivotable about a first boom axis;

a disc cutter mounted to the second end of the boom and structured to engage a rock face; and

an inertial reaction mass to stabilize the disc cutter; wherein said disc cutter is structured to be driven in an oscillating manner and movable in a nutating manner, the disc cutter including a radial edge including a leading tip and a trailing heel, the leading tip being positionable to locally oscillate adjacent to a pressure bulb formed at the intersection between the rock face and a ledge protruding away from the rock face, the leading tip of the disc cutter being movable along a path that is substantially parallel to the rock face and substantially perpendicular to the ledge to propagate a tension-induced crack in the ledge, the trailing heel of the disc cutter being spaced from said rock face during cutting.

17. (Previously Presented) A rock boring device as claimed in claim 16, wherein said disc cutter is free to rotate.

18. (Previously Presented) A rock boring device as claimed in claim 16, wherein said rock boring device includes a mounting section for said disc cutter and a driven section, and wherein said mounting section is angularly offset from an axis of said driven section whereby said disc cutter will both oscillate and nutate.

19. (Previously Presented) A rock boring device as claimed in claim 18 wherein said mounting section is angularly offset from an axis of said driven section by an angle greater than 0° and less than 90°.

20. (Previously Presented) A rock boring device as claimed in claim 18 wherein said mounting section is angularly offset from an axis of said driven section by an angle greater than 0° and less than 10°.

21-22. Canceled.

23. (Currently Amended) A rock boring ~~machine~~ device as claimed in claim ~~22~~16, wherein said boom is adapted to pivot about a second boom axis substantially perpendicular to the first boom axis.

24. (Currently Amended) A rock boring ~~machine~~ device as claimed in claim ~~22~~16, wherein said first boom axis is substantially vertical.

25. Canceled.

26. (Currently Amended) A rock boring ~~machine~~ device as claimed in claim ~~21~~23, wherein said ~~rock boring device is supported by said boom such that said device is pivotable about~~ second boom axis is a longitudinal axis of said boom.

27. (Currently Amended) A rock boring ~~machine~~ device as claimed in claim ~~21~~16, wherein said ~~rock boring device~~ disc cutter is supported to pivot relative to said boom.

28. (Currently Amended) A rock boring ~~machine~~ device as claimed in claim ~~21~~16, ~~wherein~~ including a plurality of said rock boring devices ~~are carried by said rock boring machine~~.

29. (Currently Amended) A rock boring ~~machine~~ device as claimed in claim ~~21~~16, wherein a linear cutting velocity of said rotary disc cutter is controlled by interaction with a computer that processes algorithms with variable information input being provided by strain gauges and accelerometers mounted adjacent to said rotary disc cutter.

30. (Currently Amended) A rock boring ~~machine~~ device as claimed in claim ~~21~~16, including means to reference the position of the ~~machine~~ device with respect to ~~an operating~~ the rock face, thereby allowing a predetermined depth of cut to be maintained at said rock face throughout a cutting cycle.

31. (Currently Amended) The rock boring ~~machine~~ device as claimed in claim 30, wherein said ~~machine~~ device is anchored with respect to said operating rock face thereby allowing a predetermined depth of cut to be maintained at said rock face throughout a cutting cycle.

32. (Previously Presented) A rock boring device according to claim 16, wherein said disc cutter is driven in said nutating manner.

33. (Previously Presented) A rock boring device according to claim 16, wherein said disc cutter is driven in said oscillating manner and is free to nutate.

34. (Currently Amended) A rock boring device according to claim 16, wherein ~~the disc cutter includes a tip to engage the rock face and heel positioned opposite said tip, wherein~~ the leading tip and the trailing heel of the disc cutter define with ground a non-zero rake angle ~~such that the heel is positioned to avoid contact with the rock face~~.

35. (Previously Presented) A rock boring device according to claim 34, wherein the rake angle is variable.

36. (Previously Presented) A rock boring device according to claim 32, wherein the disc cutter includes an outer cutting disc including at least one cutting surface.

37. (Previously Presented) A rock boring device according to claim 36, wherein the cutting surface includes a plurality of cutting tips that are removably connected to the disc cutter.

38. (Previously Presented) A rock boring device according to claim 36, wherein the cutting surface includes a plurality of cutting tips that are permanently connected to or formed as part of the disc cutter.

39. (Previously Presented) A rock boring device according to claim 36, wherein the cutting surface includes a plurality of bits.

40. (Previously Presented) A rock boring device according to claim 36, wherein the cutting surface includes a substantially continuous cutting ring.

41. (Previously Presented) A rock boring device according to claim 36, wherein the outer cutting disc is mounted on a mounting head.

42. (Currently Amended) A rock boring device according to claim 41, wherein at least one of the disc cutter and the mounting ~~disc~~ head includes a channel through which pressurized fluid may be injected, the channel being substantially aligned with the pressure bulb.

43. (Currently Amended) A rock boring device according to claim ~~21~~16, further comprising a mounting section for the disc cutter, the mounting section including a primary

bearing substantially aligned with a load path of the disc cutter and a secondary bearing provided to preload the primary bearing.

44. (Previously Presented) A rock boring device according to claim 43, wherein a reaction force created by engagement of the rock face is substantially along the line extending through the primary and secondary bearings.

45. (Currently Amended) A rock boring device according to claim 21, wherein the inertial reaction mass is annular and substantially surrounds the disc cutter.

46. (Currently Amended) A rock boring ~~machine~~ device as claimed in claim ~~21~~16, wherein:

the boom is structured to pivot about ~~a~~ the first boom axis to allow global pivoting of the combined boom and disc cutter,

the boom is rotatable about a second boom axis that is substantially transverse to or perpendicular to the first axis, and

the disc cutter ~~is~~ and the inertial reaction mass are structured to pivot about a third boom axis substantially perpendicular or transverse to the second axis, to allow local wrist-like pivoting movement of the disc cutter and the inertial reaction mass with respect to a distal end of the boom.

47. (Currently Amended) A rock boring ~~machine~~ device as claimed in claim 46, wherein the disc cutter is structured to pivot about the third boom axis in a first direction and the

boom is structured to pivot about the first boom axis in a second direction, wherein the first and second directions are substantially the same just before the disc cutter engages the rock face.

48. Canceled.

49. (Currently Amended) A rock boring ~~machine~~ device as claimed in claim ~~48~~16, wherein the inertial reaction mass is structured, in use, to counteract an impact force created upon impact with the ledge.

50. (New) A rock boring device comprising:

a disc cutter structured to engage a rock face and an inertial reaction mass to stabilize the disc cutter; wherein said disc cutter is mounted on a housing including a driven section having a first axis of rotation and a mounting section that supports the disc cutter for rotation about a second axis of rotation that is offset from the first axis of rotation, so that the disc cutter is driveable in an oscillating manner and movable in a nutating manner; and

a boom to support the disc cutter, said boom being pivotable about a first boom axis so as to translate the disc cutter along a path that is generally parallel to the rock face, the disc cutter being mounted on said boom to pivot about a second boom axis that is substantially perpendicular with the first axis of the driven section, the disc cutter being maintained at a proper attitude relative to the rock face by pivoting of the disc cutter about the second boom axis in a direction that is opposite to a direction in which the boom pivots about the first boom axis during cutting.

51. (New) A rock boring device according to claim 50, wherein the disc cutter includes a tip to engage the rock face and heel positioned opposite said tip, wherein the tip and heel of the disc cutter define with ground a non-zero rake angle such that the heel is positioned to avoid contact with the rock face.

52. (New) A rock boring device according to claim 50, wherein the cutting surface includes a substantially continuous cutting ring formed on a larger diameter portion of a conic section.

53. (New) A rock boring device according to claim 50, wherein the inertial reaction mass substantially surrounds the disc cutter and includes a plurality of stacked iron and lead plates coupled to pivot with the disc cutter about said second boom axis.

54. (New) A rock boring device as claimed in claim 50, wherein

the boom is structured to pivot about the first boom axis to allow global pivoting of the combined boom and disc cutter,

the boom is rotatable about the second boom axis that is substantially transverse to or perpendicular to the first boom axis, and

the disc cutter and the inertial reaction mass are structured to pivot about a third boom axis substantially perpendicular or transverse to the second boom axis, to allow local wrist-like pivoting movement of the disc cutter and the inertial reaction mass with respect to a distal end of the boom.

55. (New) A rock boring device as claimed in claim 50, wherein an end portion of the disc cutter is structured to move in a direction substantially along the rock face just before impacting a ledge protruding away from the rock face.

56. (New) A rock boring device comprising a disc cutter to engage a rock face and an inertial reaction mass to stabilize the disc cutter; wherein said disc cutter is structured to be driven in an oscillating manner and movable in a nutating manner, wherein:

the disc cutter is configured to rotate about an axis and defines a cutting plane that is substantially perpendicular to said axis, and

the disc cutter includes a tip having a part conic shape including a larger diameter portion oriented towards the rock face in use and a smaller diameter portion, the larger diameter portion including a tip arranged to locally oscillate adjacent to a pressure bulb located at an intersection between a protruding ledge and the rock face, the disc cutter including a heel positioned opposite said tip, wherein the tip and the heel of the disc cutter define with ground a non-zero rake angle so, during cutting, the heel is positioned to avoid contact with the rock face while the tip penetrates the pressure bulb to propagate tension-induced cracking.

57. (New) A rock boring device as claimed in claim 56, wherein the axis is an offset axis formed by an oscillation angle that determines an amount of oscillation.

58. (New) A rock boring device as claimed in claim 57, wherein an amount of nutation is dependent on the oscillation angle.

59. (New) A rock boring device as claimed in claim 58, wherein an angle of nutation is about twice as large as the oscillation angle.

60. (New) A rock boring device as claimed in claim 59, wherein the rake angle is greater than the angle of nutation.

61. (New) A rock boring device as claimed in claim 56, wherein the rake angle is in the range of 0-90 degrees.

62. (New) A rock boring device as claimed in claim 61, wherein the rake angle is in the range of about 5 degrees during cutting.

63. (New) A rock boring device as claimed in claim 61, wherein the rake angle is about 45 degrees to initiate the formation of an entry cut, and is changed to about 5 degrees during normal cutting.

64. (New) A rock boring device comprising a disc cutter to engage a rock face and an inertial reaction mass, said reaction mass being relatively large compared to the disc cutter, to stabilize the disc cutter;

wherein said disc cutter includes a circumferential cutting edge positioned at a periphery of the disc cutter, said disc cutter being structured to be driven in an oscillating manner and movable in a nutating manner with respect to the mass such that in operation, when engaging the

rock face, an inertial force is transmitted via the disc cutter to the rock face thereby effecting rock cutting generally radially from said disc cutter cutting edge.

65. (New) A rock boring device according to claim 64, wherein the inertial reaction mass is annular and substantially surrounds the disc cutter.

66. (Currently Amended) A rock boring device as claimed in claim 64, wherein:

the boom is structured to pivot about a first boom axis to allow global pivoting of the combined boom and disc cutter,

the boom is rotatable about a second boom axis that is substantially transverse to or perpendicular to the first boom axis, and

the disc cutter and the inertial reaction mass are structured to pivot about a third boom axis substantially perpendicular or transverse to the second axis, to allow local wrist-like pivoting movement of the disc cutter and the inertial reaction mass with respect to a distal end of the boom.

67. (New) A rock boring device according to claim 64, wherein the cutting surface includes a substantially continuous cutting ring formed on a larger diameter portion of a conic section.

68. (New) A rock boring device comprising:

a boom having a first end and a second end, the first end being pivotable about a first boom axis;

a disc cutter mounted to the second end of the boom and structured to engage a rock face; and

an inertial reaction mass, relatively large compared to the disc cutter, to stabilize the disc cutter; wherein said disc cutter is structured to be driven in an oscillating manner with respect to the mass such that in operation, when engaging the rock face, a high inertial force is transmitted via the disc cutter to the rock face thereby effecting rock cutting generally radially from said disc cutter.

69. (New) A rock boring device according to claim 68, wherein the inertial reaction mass substantially surrounds the disc cutter.

70. (Currently Amended) A rock boring device as claimed in claim 68, wherein:

the boom is structured to pivot about the first boom axis to allow global pivoting of the combined boom and disc cutter,

the boom is rotatable about a second boom axis that is substantially transverse to or perpendicular to the first boom axis, and

the disc cutter and the inertial reaction mass are structured to pivot about a third boom axis substantially perpendicular or transverse to the second axis, to allow local wrist-like pivoting movement of the disc cutter and the inertial reaction mass with respect to a distal end of the boom.

71. (New) A rock boring device according to claim 68, wherein the cutting surface includes a substantially continuous cutting ring formed on a larger diameter portion of a conic section.